DOCUMENT RESUME

ED 259 018 TM 850 388

AUTHOR Hodge, Milton H.; Britton, Bruce K.
TITLE Processing Strategy and PI Effects in Recognition Memory of Word Lists.
PUB DATE 81
NOTE 14p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Encoding (Psychology); Higher Education; Learning Strategies; *Memorization; Memory; Nouns; Performance Factors; *Primacy Effect; *Recognition (Psychology); Short Term Memory; *Word Recognition
IDENTIFIERS Automatization; Distraction; *Proactive Interference; Schulman (A I)

ABSTRACT

Previous research by A. I. Schulman argued that an observed systematic decline in recognition memory in long word lists was due to the build-up of input and output proactive interference (PI). It also suggested that input PI resulted from process automatization; that is, each list item was processed or encoded in much the same way, producing a set of highly similar memory traces. Based on Schulman's conclusions about uniform processing of a word list, the research described in this paper began with the hypothesis that requiring subjects to periodically change their processing strategy would slow the build-up of input PI. In two experiments using lists of 100 and 140 common nouns, the decline in recognition memory was prevented by asking subjects to rate each word, during presentation, on familiarity, imagery, size, or pleasantness. In addition, one rating task was found to be as effective as four rating tasks in preventing the decline in recognition. Both types of rating tasks led to ceiling effects which rendered the processing automatization hypothesis ambiguous. An additional experiment on output PI--the influence of early recognition tests on later tests--indicated that output PI does not significantly account for the decline in recognition memory. (Author/GDC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED259018

Processing Strategy and PI Effects in Recognition Memory of Word Lists

Milton H. Hodge and Bruce K. Britton

University of Georgia

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☑ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Hodge, Milton H.

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

TM 850 388

Processing Strategy and PI Effects in
Recognition Memory of Word Lists

Milton H. Hodge and Bruce K. Britton
University of Georgia

Ten years ago, Art Schulman reported several studies which showed that the accuracy of recognition memory declined systematically over the course of a long list of common nouns. This systematic decline is in marked contrast to the steady-state memory observed by Shepard and others (Shepard & Chang, 1963; Shepard & Teghtsoonian, 1961; Norman & Waugh, 1963). Schulman (1974) points out that steady-state studies typically alternate between input and test items while in his experiments a single long presentation sequence is followed by a long series of recognition tests. To account for the decline in recognition memory, Schulman suggested the buildup of proactive interference -- input PI during the presentation sequence and output PI during the recognition tests. Input PI represents the deleterious effect of early items on the encoding of later input items while output PI reflects the influence of "early recognition judgments upon later ones . . . " (p. 16). Schulman thinks that input PI results from what he calls "processing automatization." It tends to occur in long repetitive tasks that limit the number of alternative processing strategies. In effect, a subject processes each list item in much the same way, and consequently, the resulting memory traces are all very similar -- a circumstance which apparently leads to what I have called input PI.

Before considering output PI, I would first like to examine input PI in more detail and mention some relevant research. Since PI is assumed to increase with each additional word, recognition of words from a short list should be better than words from a longer list. Furthermore, if RI or retroactive interference is not operative, recognition of the first N words should be independent of subsequent words in a list. To test his hypothesis, Schulman (1974) first constructed a random sequence of 100 nouns. Three groups were then shown either the first 25, the first 50, or all 100 words at a 2-sec rate of presentation. Following list presentation, the groups performed a variable-duration filler task to ensure that 300 sec elasped between the beginning of list presentation and the start of the recognition tests. During the recognition tests, the subjects were asked to pick out the old word in each pair of words. The results are given in Fig. 1 on the HANDOUT. The curves show that the accuracy of recognition declines monotonically over the successive quarters (25 pairs of words) and that the decline is independent of list length -- compare the 50 and 100 groups at Quarter 2.

Last year at these meetings, I reported a replication of Schulman's study which involved three different list lengths -- 60, 100, and 140 words -- based on three different-size quarters -- 15, 25, and 35 words, respectively. Except for the use of different words and paced recognition tests (4 sec rate), the procedures were identical to those of Schulman. The results are presented in Fig. 2 on the HANDOUT. Once

again, mean proportion correct recognition responses declined systematically over list quarters, with the largest decline in Group 140 and the smallest in Group 60, just as was expected. Further analyses of the data indicated that the performance declines were not dependent on retroactive interference. The experiment thus replicates the decline in recognition memory found by Schulman, but under somewhat different conditions and with different list lengths. It seems clear that the amount of PI is directly related to the number of words in a list.

Earlier, I mentioned that Schulman also proposed that output PI is partly responsible for the decline in recognition memory. Although he suggests a number of ways in which output PI might occur, I decided that it might be more useful to attempt an experimental separation of input and output PI. My reasoning went like this. Output PI represents the influence of early recognition tests on later tests. So, given the prior presentation of a list of words, couldn't output PI be reduced by omitting the recognition tests in one or more quarters? If output PI is important, then recognition performance should improve with the omission of one or more quarters. Four different groups received the 100-word list of Experiment 1. One group was tested on all four quarters, a second group only on the last three quarters, a third group on the last two quarters, and a fourth group only on the last quarter. Although performance did show some improvement as fewer quarters were tested, the differences among the groups were not significant. We interpreted this finding to mean that output PI does not play

an important role in the recognition memory of the word lists used in our experiment. The significance of this result is that output PI can essentially be ignored in our attempt to account for the decline in recognition memory.

Now I would like to describe two experiments designed to assess the role of processing automatization in the generation of input PI. According to Schulman (1974), processing automatization produces a set of highly similar memory traces, and consequently, an inability to distinguish clearly among the words or the words and the distractors during the recognition tests. If input PI is the result of uniform processing of a word list, then requiring subjects to change their processing strategy periodically ought to slow the buildup of PI. Given the moderate declines obtained in the first experiment, we decided that changing the processing strategy once a quarter should effectively counter the buildup of PI. However, to ensure that subjects actually used a different strategy each quarter, rating tasks were designed which made use of four word attributes that have led to high levels of recall and recognition in other memory studies. Thus, we presumed that changing the encoding dimension every quarter and using dimensions known to be effective in orienting tasks would substantially reduce the decline in recognition memory.

Method

Two experiments were conducted; they differed only in the length of the word list -- 100 or 140 words. In each study, independent subjects were randomly assigned to one of three

groups. Each group saw the same list of words, performed an arithmetic filler task, and then received a series of recognition tests. In Group 1, during list presentation the subjects were asked to rate each word, as it appeared, on familiarity for the first quarter, imagery for the second quarter, size for the third quarter, and pleasantness for the last quarter. On a separate sheet for each attribute, the subjects wrote 1, 2, or 3 to indicate whether they thought each word had a little amount, a moderate amount, or a good deal of the attribute. On completion of the filler task, written instructions for the recognition tests were presented. Group 2 was identical to Group 1 except that the subjects rated all the words only on one dimension -- pleasantness. Group 3 received the standard intentional learning task used in the earlier experiments. Both of these groups represented control conditions, Group 2 to provide a single unchanging incidental processing strategy against which to evaluate any effects of the changing processing strategies of Group 1, and Group 3 to help decide whether the incidental processing tasks countered the buildup of PI.

The stimuli and distractors came from the same pool of words used in the previous studies. The input presentation rate and the recognition test rate were both 3 sec. The duration of the filler task was 300 and 180 sec in the experiments which used the 100 and 140 word lists, respectively. In total, 600 sec elapsed between the start of the input list and the start of the recognition tests in both studies.

Results and Discussion

The outcome of both experiments is presented on the back of the HANDOUT in Figs. 3 and 4. In general, the results are more or less compatible with our expectations, but there are several discrepancies which I will discuss shortly. First, however, an analysis of variance indicated significant differences among the groups and marginally significant differences over list quarters in the experiment with the 100-item list (Fig. 3). In the experiment with the 140-item list (Fig. 4), both main effects and the interaction were reliable. In both studies, an orthogonal comparisons analysis showed that Groups 1 and 2 performed significantly better than Group 3, but that Groups 1 and 2 did not differ. Lastly, Newman-Keuls tests demonstrated that the improvement shown by Group 3 from Quarter 3 to Quarter 4 was significant.

How do we interpret these results? First, the decline shown by Group 3 in both studies presumably represents a build-up in PI, however, the spectacular improvement on the last quarter in Fig. 4 is obviously contrary to the PI hypothsis. Curiously, we obtained a similar but weaker effect in Group 140 of the first experiment -- look back at Fig. 2. We have not yet attempted to explore this anomaly, but it is high on our agenda. A second finding that surprised us was the lack of decline in Groups 1 and 2 and the nearly identical, nearly perfect performance of these groups. The nearly perfect performance represents a ceiling effect which may be largely responsible for the nearly identical performance. We are now collecting

RT data, with the hope of separating the two groups. Perhaps the most striking finding was the virtually complete elimination of the decline so characteristic of groups asked to intentionally learn a word list for later recognition tests. Group 1 suggests that each word attribute is equally effective in preventing a performance decline, but the results of Group 2 indicate that one rating task is just as effective as four tasks. If you are perplexed, let us join you. We don't understand why Groups 1 and 2 showed identical performance nor why the rating tasks were so effective in countering what we assume is a buildup of PI. These questions, along with the mysterious improvement shown in Group 3 in Fig. 4, will keep us nicely occupied for sometime.

References

Hodge, M. H. (1981, November). Some proactive inhibition effects in recognition memory of word lists. Paper presented at the meeting of the Psychonomic Society, Philadelphia, PA.

Norman, D. A., & Waugh, N. C. (1968). Stimulus and response interference in recognition-memory experiments. Journal of Experimental Psychology, 78, 551-559.

Schulman, A. I. (1974). The declining course of recognition memory. Memory & Cognition, 2, 14-18.

Shepard, R. N., & Chang, J. (1963). Forced-choice tests of recognition memory under steady-state conditions. Journal of Verbal Learning and Verbal Behavior, 2, 93-101.

Shepard, R. N., & Teghtsoonian, M. (1961). Retention of information under conditions approaching a steady state. Journal of Experimental Psychology, 62, 302-309.

Processing Strategy and PI Effects in Recognition Memory of Word Lists

Milton H. Hodge and Bruce K. Britton

University of Georgia

Psychonomic Society, 1982

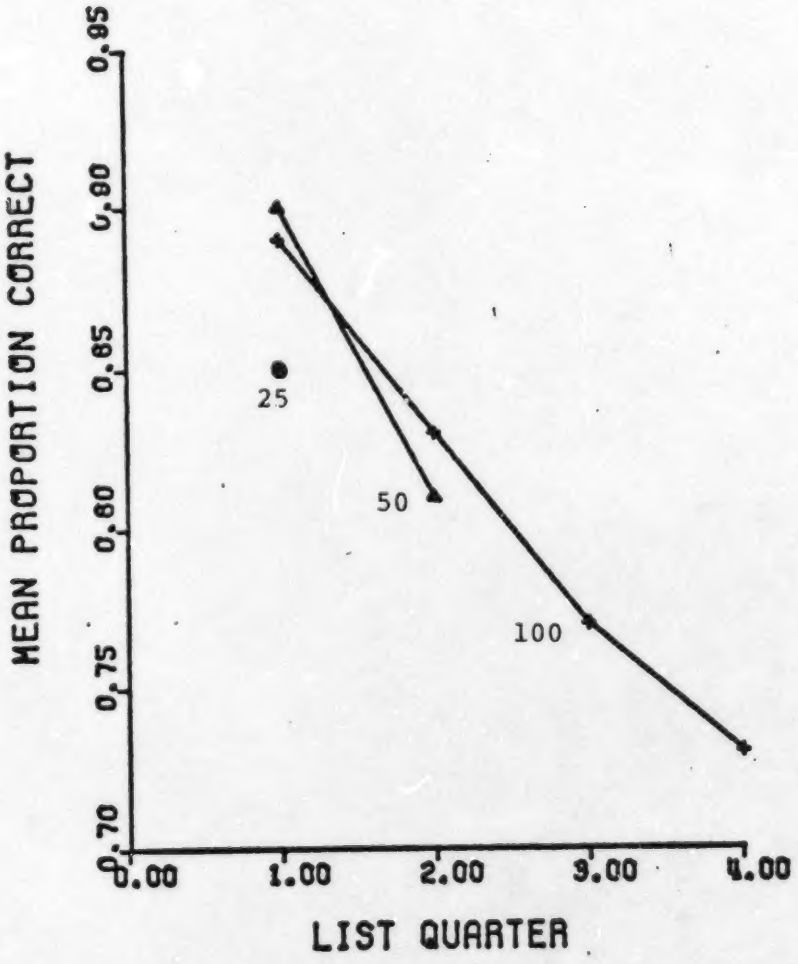

Fig. 1. Schulman (1974) Results

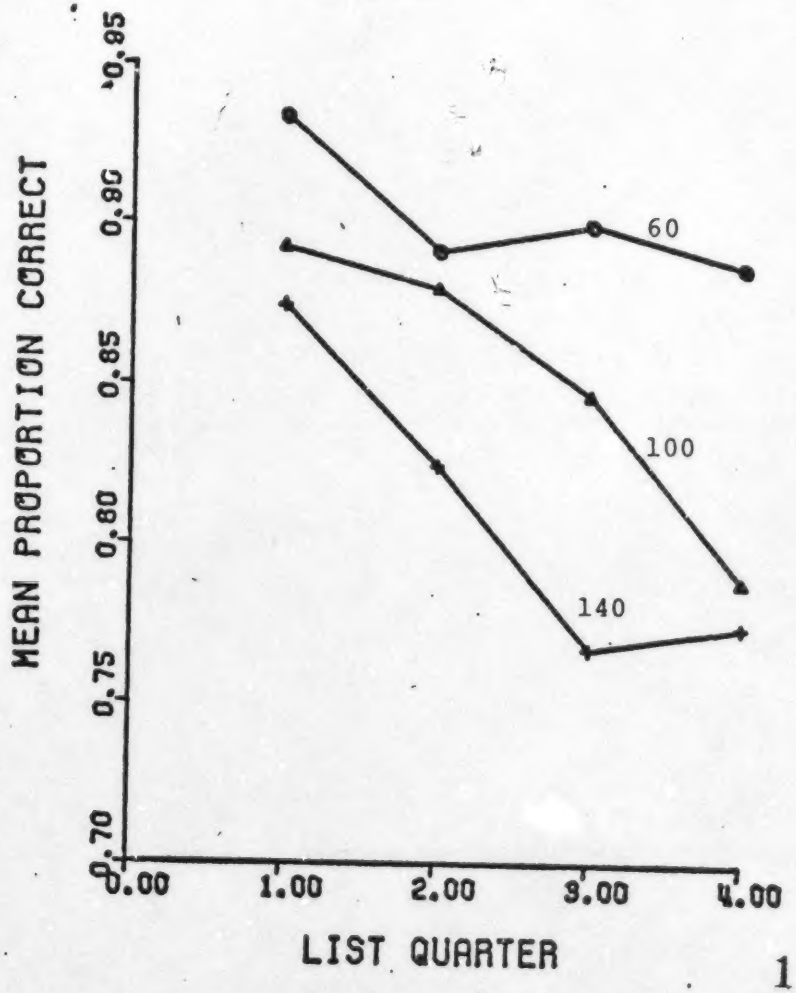

Fig. 2. Results of Experiment I

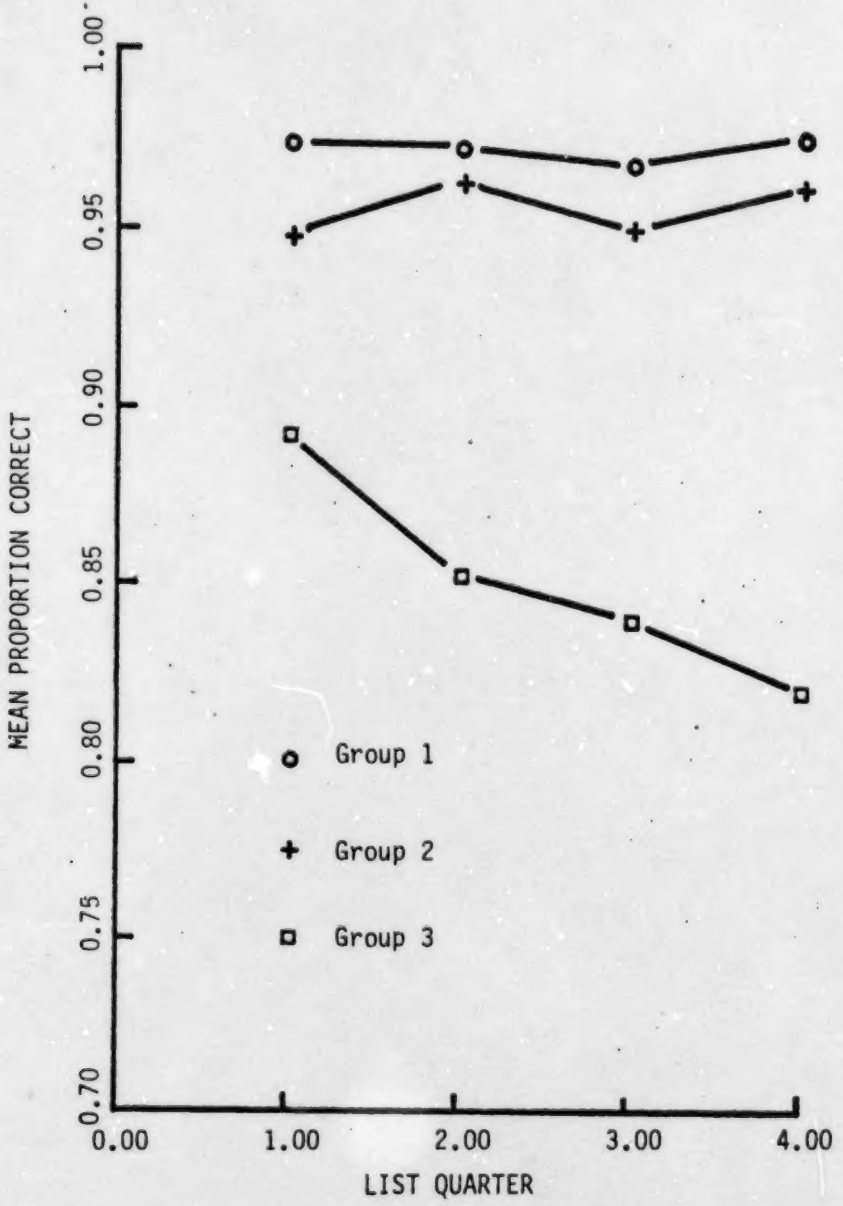

Fig. 3. Results of Experiment 3-100

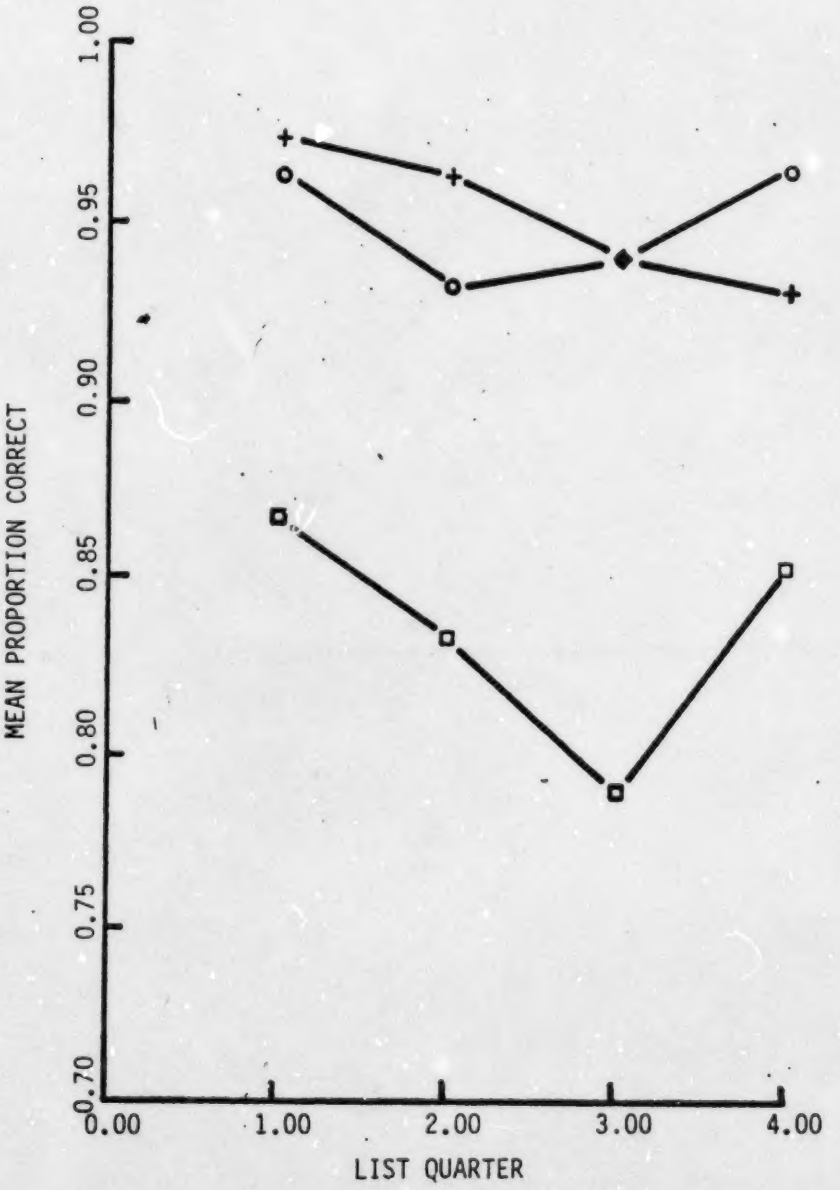

Fig. 4. Results of Experiment 3-140

Abstract

Schulman (1974) argued that the systematic decline in recognition memory he observed in long word lists is due to the build-up of input and output proactive interference (PI). He also suggested that input PI is the result of processing automatization in which it is assumed that each list item is processed or encoded in much the same way, thus producing a set of highly similar memory traces. We reasoned that if input PI is due to uniform processing of a word list, then requiring subjects to change their processing strategy periodically ought to slow the build-up of input PI. In two experiments with lists of 100 and 140 common nouns, it was found that the decline in recognition memory could be prevented by asking subjects to rate each word during presentation on familiarity, imagery, size, or pleasantness. However, it was also found that one rating task was just as effective as four rating tasks in preventing the decline, and that both led to ceiling effects which rendered the processing automatization hypothesis ambiguous.